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RETURN TO
SSZAA

STANDARDIZATION OF AGENA B

Standardization
study completed
20 Jun 1961
— chronology
USAF

A PRESENTATION
of the
CASE FOR
STANDARDIZATION
including
CONTRACTUAL ASPECTS

1128

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REVIEWED
BY
DATE

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DOWNGRADED AT 3 YEAR INTERVALS;
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SUMMARY

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STANDARDIZATION OF AGENA B

SUMMARY

The presentation covers the evolution of AGENA configurations from the early beginnings under WS-117L, through the AGENA A, to the present day AGENA B. The evolution from three basic configurations to the multiple configurations serving the present array of military satellites is outlined. The expanding role of AGENA serving other governmental agencies such as NASA is noted. The role of AGENA as a stage vehicle offering not only orbit mission capabilities but also ascent-only mission capabilities is recognized.

Analysis led to the conclusion that a single basic vehicle could be produced that would be capable of fulfilling a satisfactory portion of the requirements of each program. A comprehensive study was initiated to determine if a configuration could be selected to achieve standardization. The results of the study were conclusively positive. Charts used in the oral presentation are included in this brochure for your reference.

There is a discussion of the procurement aspects of obtaining the Standard AGENA on a competitive basis, utilizing a fixed price contract. The advantages and disadvantages of competition to establish a second source at this time are discussed. Likewise, utilization of a fixed price type contract at this time is explored. Conclusions and recommendations are presented regarding the procurement aspects of obtaining the Standard AGENA at this time. Soliciting competition for establishment of a second source and utilizing a fixed price type contract at this time is not feasible, practicable, nor desirable. Charts used in this portion of the presentation are also included for reference.

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TECHNICAL

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In early 1959 the capability to build a restartable liquid engine was confirmed at Arnold Center. This one fact immediately allowed the use of higher altitude orbits with practical weight lifting capability using two stage vehicles instead of the three and four stage combinations then available. A vehicle was configured, called the AGENA B, and assigned for use by the multiple programs using the AGENA A. The level of development of the respective mission payloads was substantially higher at this time; therefore, the increased capability of the AGENA B enabled each program to specifically identify mission requirements. However, the background of minimal mission capability which prevailed continued the development of optimized vehicles for each program. Six additional configurations were defined in three programs; two Discoverer, caused by engine development status; two MIDAS, caused by progressive design improvements; and two SAMOS, due to different missions. Status of these configurations is as follows:

Configuration	Programmed	Built	Launched (To Date)
6. Discoverer	4	4	4
7. Discoverer	23	13	7
8. MIDAS, Series II	3	2	1
9. MIDAS, Series III	4		
10. SAMOS	2	1	0 (1 cancelled)
11. SAMOS	2	1	1 reprog - 1 canc.

II - PROGRAM STATUS

During the design and test of the AGENA B, recognition of the capability of the vehicle induced several additional programs to consider its use, a process which is still continuing. The development defined for each of the three programs previously mentioned is also progressing as approved. Each is being pursued using the optimization technique that was necessary due to "state-of-the-art" at the inception of WS-117L. Limited capability available at the start of WS-117L demanded complete integration of an entire vehicle to make the mission feasible. The programs now schedule heavier payloads and greater life requirement associated with assured reliability making redundant equipment and large weights the result, and continuing the requirement for optimized vehicles. Following the optimized vehicle concept, eleven more configurations have evolved; six SAMOS, (1) two new missions, with two steps in one mission; (2) one reprogrammed mission, with program schedule and costs causing an increase from two to three configurations; four NASA, caused by four missions; one Advent; and one MIDAS, required to demonstrate operational capabilities. These program configurations are scheduled as follows:

Configuration	Programmed
12. SAMOS F-2	1 (Reprogrammed from Configuration 11)
13. SAMOS F-2 [redacted]	3
[redacted]	

[redacted]

Configuration (cont'd)	Programmed (cont'd)
14. SAMOS F-3	4
15. SAMOS E-5	1
16. SAMOS E-5	7
17. SAMOS E-6	9
18. NASA Ranger	5
19. NASA S-27	1
20. NASA Comsat	2
21. NASA NIMBUS	
22. Advent	3
23. MIDAS, Series IV	5

At this time, four additional missions are being identified for the future with at least twenty flights planned. One, SAINT, 4 each; two, SNAPSHOT, 4 each; three VELA HOTEL, 5 each; and four MIDAS, Series V, more than 7 flights.

III - ANALYSIS OF SITUATION

AGENA, because of somewhat strict adherence to the principle of optimization and to individual tailoring to satisfy peculiar mission requirements, has been produced in twenty-three different configurations. And at this time four more are in the final stages of planning and procurement, and may be subjected to the same technique. Several months ago it became overwhelmingly evident that AGENA had achieved a much larger role in military space systems endeavors than was originally envisaged for WS-117L. In addition, other agencies such as NASA were beginning to plan space missions using the AGENA as a stage vehicle. AGENA was also recognized to require not only orbit mission capabilities but also ascent-only mission capabilities, e.g. the ability to serve many and varied space missions and payloads.

Analysis of the several configurations clearly indicated a repetition of certain functions which were designed into the original WS-117L vehicle and remain in those now being configured. These functions are being performed by components that are still basically the same in function as they were in the beginning. Mission peculiarities that have acted to cause configuration change have gradually evolved as differences in the application of hardware from its original functional intent or in duplication to achieve a longer vehicle life.

The extent to which component developments and functional applications have changed the basic concept of AGENA has a direct bearing on the ability to produce a single basic vehicle capable of fulfilling an appreciable (satisfactory) portion of each program's requirements. It was determined that a comprehensive study should be initiated to review all programs, classify all functions--common and peculiar, and determine if a configuration could be selected to achieve standardization. This work was started [redacted] 1961.

[redacted]

IV - AGENA STANDARDIZATION

While the results of our contract study effort have not been officially presented as of 15 August 1961, the findings were clear that standardization could be satisfactorily achieved. Sufficient study was accomplished to indicate that singleness of functional design prevails for those components which are necessary to perform ascent functions. The degree of extension of these components functionally to accomplish on-orbit requirements is a pecularity of each program.

In the study conducted the feasibility of placing a Standard AGENA into final design and production was established. All programs were canvassed throughout all systems and subsystems. All functions were assembled and categorized--common and non-common. All functions were compared with equipment capabilities and equipments were selected having common functional capabilities. Modifications, minor in nature necessary to other equipments were determined. All individual program requirements were assembled and categorized such as life, power, attiude, altitude, etc.

A design compatible airframe was conceived, a mockup was constructed, and mission common components were installed. Provisional space was set aside for mission peculiar functions and related components. Thus, a single vehicle, basically simple in design, and meeting all program requirements was established. This vehicle has built-in adaptability for advanced components without change in basic design of structure. A modular concept is employed in addition for flight and mission equipment. Vehicle equipment has not been co-mingled with payloads and payload peculiar equipment or with additional vehicle equipment necessary for a particular mission.

For the simple high-performance ascent type mission only a limited amount of equipment need be carried. For program systems where AGENA is used on orbit additional equipments are loaded in spaces where provisions have been made for these equipments. When not required, the equipment and its wiring harnesses may be left out.

To date, the AGENA has been designed, engineered, and produced on an experimental basis as an R&D item for use on military satellite systems. In most cases there have been "block type" releases of three or four vehicles of a particular configuration to satisfy mission requirements of an R&D nature. In no case to date has there been identification of vehicle or mission in operational terms. Design for production on a line basis with the associated standard requirements for uniform installation of certain equipment and provision for additional special equipment has not been practiced. Also each vehicle, because of its narrow configuration orientation, has not had the advantages of design for accessibility, maintainability, reproducibility, or interchangeability. These refinements, more common to production items, were [redacted]her economical nor feasible.

[redacted]

Neither were they considered compatible with schedule requirements. Contractual arrangements further inhibited wide spread generalization of vehicle requirements, hence standardization has not heretofore been a subject for serious consideration.

Times have changed as has been pointed out above. The use of AGENA is expanding and the numbers to be considered are ample enough to require that the vehicle be engineered for production. The experience and know-how accumulated over the past three years coupled with the results of the recent study add to the desireability and practicability of standardization.

V - ADVANTAGES OF STANDARDIZATION

1. Technical considerations

a. Standardization will facilitate production and permit the employment of common tooling capable of higher rates. Special jigs and other tooling would primarily be limited to the mission peculiar bits of structure, modules and other assemblies.

b. Line production techniques automatically provide for lower costs and firmer scheduling.

c. Basic vehicle is not committed to a program requirement until complete, thus allowing the best in flexibility of assignment.

d. Test practice in present programs is to test at levels of successive complexity. No change in this basic policy is contemplated. Contrary to present practice but beneficial, single test specifications and written procedures are applicable to standardized vehicles. As test experience is gained, additional simplification will result.

e. The processing of vehicles of different configuration has caused duplication of checkout test facilities under present practices. This has been considered preferable to continuous modification as production proceeds. Standardization will permit a single checkout line for the basic vehicle geared to higher processing rates with reduced equipment and facilities required.

f. Checkout of basic standard vehicles after mission equipment modules are added is a separate operation equipped especially for the total vehicle being processed.

g. The test results of a vehicle flight or ground test will be directly applicable to all programs after standardization. Presently, vehicles are considered as separate design problems

[redacted]

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and application of test results must be made by inference.

h. Standardization provides for additional line development of the AGENA and product improvement by scheduled production blocks becomes possible.

i. Standardization provides adaptability for advanced components without necessity for change in basic design.

j. All the "ilities" are enhanced by standardization--producibility, accessibility, maintainability, reliability, interchangeability, etc.

k. Weight penalties normally expected to be associated with standardization are non-existent with but one exception--Discoverer on THOR. Refer to the weight comparison chart.

2. Programming considerations

a. Standardization will promote more efficient production programming activity. By separating the common elements, the AGENA can be budgeted and scheduled on a production basis with an orderly progression of blocks. The block concept for configuration purposes, while in existence for small numbers of vehicles in most programs, becomes really effective when total numbers for all programs are considered. Bulk procurement of subcontracted components may be encouraged as well as larger lot production releases.

b. The programs gain from standardization by having the capability to use any basic vehicle coming down the line. Present practice allocates vehicles at an early date and exclusively by contract. Any malfunction or accident to the AGENA can cause a launch date slippage months in advance.

c. Development of mission packages need not be paced by AGENA production schedules. The totally integrated vehicle, which has been the rule of the past, required payload completion dates in sufficient time to allow installation of flight hardware during the assembly process, four to six months prior to launch. Standardization of AGENA would permit this installation just prior to the system test period, normally two to three months prior to launch. Development problems and slippages on one mission package would not hold up another program activity. The Standard AGENA would accept the next available mission package should such a problem exist.

d. The Standard AGENA will be procured on a contract separate from the payload or mission contract. The accumulation and segregation of costs will be improved as will the efficiency of fabrication and test. Learning will take its proper and regular place in the production scheme.

[redacted]

3. Management considerations

a. Standardization will facilitate management control of vehicle development and production through a single contract for AGENA effort. The single contract will assure more accurate audit of effort and more precise cost determination. Under present practice all costs are collected within a given program for both complex and simple vehicles. Resultant cost analysis and negotiation are now too dependent on experience and judgement.

b. Program management would not be hampered by necessity of precisely meeting a specific launch date with a standard AGENA. The standard vehicle production line would generate the capability for meeting any series of launch dates with each AGENA having equal importance. This would reduce over-emphasis of effort on any individual AGENA to the exclusion and detriment of following or preceding vehicles.

c. It is expected that the continued technical development of the standard vehicle will benefit from a single line of direction and be given full support by top engineering talent. The present contractor organization, for development of the AGENA, has been derived by dividing and denuding a central engineering organization and giving each program office a share of the technical talent. Standardization will require re-grouping and return technical talent to the responsible central organization.

d. Vehicle development may be monitored more closely by a smaller amount of management talent. At present, six separate engineering organizations representing the program managers have authority to approve design modifications to the AGENA. Each claims necessity for monitoring development of the AGENA for their program purposes. Standardization will require consolidation of this effort in so far as it applies to AGENA.

e. Advanced development of AGENA is presently studied and justified under each individual program. It is recognized that such studies should be continued to a minor degree. Management of this type of effort after standardization would be under the AGENA contract and applied to vehicle capability changes. Advanced development and application of mission hardware would remain under the program contract.

VI - CONCLUSION

The Standard AGENA is a logical conclusion of the development and experience gained since the beginning of WS-117L. A vehicle may now be achieved which will perform functions which have been established as being common to all sp[redacted] This vehicle may be quickly applied

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to all missions that are now scheduled or that are now scheduling its use. This is particularly interesting since the basic vehicle is an ascent vehicle which because of its excellent design and built-in characteristics may also perform for on-orbit missions. It has developed the ability and the capability to serve many and varied space missions and payloads.

The application of recognized and experienced development, programming, and management techniques to the common elements making up the Standard AGENA can produce a reliable, producible, and maintainable vehicle at minimum cost. Its ready adaptability and responsiveness to changing program schedules and requirements is clearly evident.

The degree of independence which clearly attaches to the concept of a Standard AGENA under its own procurement contract opens opportunities for:

a. More economical production.

b. Better reliability.

c. Accuracy in the collection of costs and better future pricing.

d. More freedom for the program offices with less worrying to be done about the vehicle.

e. Better opportunity for planned product improvement in both vehicle and mission payload areas.

These are but a few of the advantages to be gained. There are no "cons," only "pros" in this technical analysis of the Case for Standardization of the AGENA B.

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CONTRACTUAL

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PROCUREMENT OF STANDARD AGENA

I - ASSUMPTIONS

In considering the procurement aspects of obtaining the Standard AGENA certain assumptions have been made in order to confine the investigation to relevant areas.

1. Second Source. Consideration is being given to the feasibility and practicability of soliciting competition from industry to establish a second source for production of the Standard AGENA.

2. Fixed Price Contract. Consideration is being given to the feasibility and practicability of contracting with the second source on a fixed price basis to produce the Standard AGENA.

3. LMSC Production. LMSC will continue to produce AGENAS, including a limited number of Standard AGENAS.

4. Uniform Configuration. It is required that identical configuration be maintained between Standard AGENAS produced by LMSC and the second source.

5. Delivery January 1963. Delivery of the first Standard AGENA is required by January 1963.

II - COMPETITION - SECOND SOURCE

In considering the establishment of a second source by soliciting industry on a competitive basis, there are certain advantages to obtaining competition.

1. Advantages

a. Price. It is possible, although not guaranteed, that AGENAS can be obtained at a lower cost by soliciting competitive proposals from industry. The price advantage, if any, would certainly not accrue to the Air Force until a significant number of units had been produced at some considerable time in the future.

b. Back-up. Establishment of a second source would provide the Air Force with a back-up source for AGENAS if and when needed.

c. Utilization of Industrial Base. Establishment of a second source makes use of mor [redacted] ates' industrial base and

[redacted]

promotes development and advancements of U.S. technology. Assistance might also be given to distressed labor areas.

d. Industrial Relations. Establishment of a second source tends to promote industrial relations throughout the United States by spreading our production requirements.

e. Stimulate Efficiency. Competition between the new and old source should promote interest in producing a better item at a lower price. It removes the old producer from the dominant, monopolistic position and stimulates interest in doing a better job for the Air Force.

2. Disadvantages

a. Duplicate Costs. Establishment of a second source would entail certain duplication of costs to the Air Force. Such items as facilities, special tools, test equipment, management and overhead are estimated at approximately 10 million dollars, with an immediate cash outlay of 5 million dollars.

b. Longer Lead Time. A second source would require at least six months more production and test time before the first AGENA was ready to launch. An additional eight months would be required to complete design, work statement, procurement action, source selection, and award a contract. Thus, total lead time would take approximately 14 months more to get the first AGENA from a second source.

c. Need Firm Configuration. Unless it is desired to go through the conceptual and preliminary design stages with a second source, a reasonably firm configuration is needed to solicit competition. Some of this work has been completed by LMSC but is not in state such that it can be used in soliciting competition.

d. Management Problems. Countless management problems are created for the Air Force and old source by introduction of a second source. Air Force personnel are presently fully occupied managing the programs at LMSC. A second source would require additional Air Force management personnel to exercise surveillance and direction over the program. Moreover, LMSC would have to create a technical liaison office to assist the second source with technical and manufacturing aspects of the vehicle.

e. Impact of Cut-Back. If there should be a cut-back in the AGENA program, there would be problems of which contractor to reduce or terminate, re-scheduling AGENA production and deliveries, industrial relations and possible utilization of a facility at less than optimum efficiency.

f. Reliability Decreased. It is axiomatic that quality of workmanship and thereby re[redacted] as additional units are produced. Introduction of a seco[redacted]vitably have an adverse effect upon reliability in the [redacted] production.

3. Requirements

a. Industry capability. In order to obtain desired competition industry must have the technical ability, facilities, manpower, and financial resources to accomplish the task. These capabilities are present within our industry, but close guidance should be obtained from LMSC in order to benefit from their experience. A source list can be developed from companies known to possess the required capabilities.

b. Firm configuration. In order to obtain desired competition and not repeat much of the study and development work which LMSC has already completed on the Standard AGENA concept, it is necessary that the configuration be reasonably firm. It should also be in a form which can be transmitted to the potential sources for use in preparing their quotations.

c. Company desire. The potential second sources must have a desire to undertake production of a standard AGENA. The over-all program should be attractive; there should be good opportunity for a reasonable profit; and the company must feel it has a possibility of winning the competition.

d. Lead time. Establishment of a second source involves certain unavoidable time elements such as procurement, engineering, tooling, production planning, and production learning curve. Programs requiring the Standard AGENA must be able to be scheduled to absorb this additional lead time.

e. Funds. Production start-up costs for engineering, tooling, test equipment, special machines, and plant layout for a new source will require substantial cash outlay immediately. It will be necessary for LMSC to establish a technical and manufacturing liaison group to provide guidance to the new source. Initial requirements would be approximately 30 people and cost about .5 million.

III - FIXED PRICE CONTRACT

1. Advantages

a. Less Air Force contract management. Under a Fixed Price type contract Air Force contract administration is simplified. There is no requirement for complex records and surveillance by Air Force over contractors' government property records. Likewise, the continuous requirement for auditing and approving all contractor expenditures is obviated.

b. Incentive. Contractors performing under a Fixed Price contract have strong incentive to increase their efficiency, make

[redacted]

prompt deliveries, and reduce costs in order to maximize their profits.

c. Less overrun possibility. Because of the incentive to minimize costs and maximize profits there is less possibility that a contractor will overrun his contract price and cost the government more when the contract is redetermined.

d. Air Force Budgeting facilitated. Under a Fixed Price contract where there is incentive to reduce costs and avoid overruns, Air Force Budgeting is facilitated. Funds requirements and costs are more reliable.

2. Disadvantages

a. Need complete procurement data. In order to arrive at a complete meeting of the minds and to write a Fixed Price contract, it is essential that complete procurement data be available. These data include such things as engineering drawings, specifications for material, performance, packaging, etc. This information is needed by potential suppliers in order to submit Fixed Price proposal. At this time no procurement data are available on the Standard AGENA.

b. More contract changes. Under a Fixed Price contract it is necessary to negotiate a contract amendment each time a change is desired in the original terms or specifications. It is not possible, as in cost-type contracts, to issue CCNs to be consolidated and negotiated at a later date. Therefore, procurement of undeveloped item under a Fixed Proce contract will inevitably lead to more contract changes and increased work for the customer and the contractor.

c. Fixed Price mixed with CPFF contracts. Mixing Fixed Proce and CPFF contracts in the same plant and especially for the same item increases the responsibility and importance of much closer Air Force contract management surveillance by production and auditor personnel to assure appropriate collection of cost by the contractor.

3. Requirements

a. Procurement data. Solicitation of industry for quotations on a Fixed Price basis cannot be made without complete, detailed procurement data. Potential contractors must have a well-defined, precise description of the item on which they are to bid so that fair and reasonable prices without exorbitant contingency factors may be submitted.

b. Price knowledge. The procuring agency should have knowledge regarding the price which should be paid for the item. This knowledge may have been acquired through prior purchases of the same or like items, familiarity with the type of item or detailed

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and accurate price analysis. Utilization of a Fixed Price contract should not be attempted unless there is assurance that a fair and reasonable price may be obtained for the Government.

IV - CONCLUSIONS

1. Competition for Establishment of a Second Source

a. No firm configuration. The Standard AGENA configuration is relatively unstable at this time. LMSC has completed a feasibility study and a mock-up. However, the configuration certainly will change before completion of flight test.

b. Second source problems. Introduction of a second source to produce the Standard AGENA will create many additional difficult problems. Close technical guidance will be required by the new source. This will require additional LMSC manpower for which the Air Force will have to pay. Likewise, the Air Force will require additional manpower to exercise surveillance over another contractor.

c. Questionable cost savings. There is no real assurance that a second source can produce at less cost than the present contractor. There are significant start-up costs which must be amortized over considerable time before the Air Force would accrue benefits, if at all, from introduction of a second source.

d. No back-up requirement. Based upon firm and program requirements, there is no need at this time for a second source. LMSC is capable of delivering sufficient quantity to meet our requirements.

e. Cannot deliver by Jan 61. If the requirement for launch of the first standardized AGENA is Jan 63, it is not possible for a second source to deliver the standardized AGENA by Jan 63.

V - FIXED PRICE CONTRACT

1. Desirable. It is desirable to contract on a Fixed Price basis whenever conditions are such that this is feasible.

2. No procurement data. The Standard AGENA is presently in the development stage and procurement data are not available at this time.

3. Disadvantages versus advantages. Thus, it appears that the disadvantages of obtaining the Standard AGENA by soliciting competition and writing a Fixed Price contract out-weigh the advantages at this time.

VI - RECOMMENDATIONS

1. Approval of the Standard AGENA concept.

[redacted]

[redacted]

2. Grant immediate authority to award a contract to proceed with manufacture of the Standard AGENA.

3. Write a cost-type contract with LMSC immediately and obtain procurement data as soon as possible.

4. Consider competition and Fixed Price type contract at a later date when the concept, design, manufacture and flight test of the Standard AGENA has been proven.

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TECHNICAL
CHARTS

AGENA

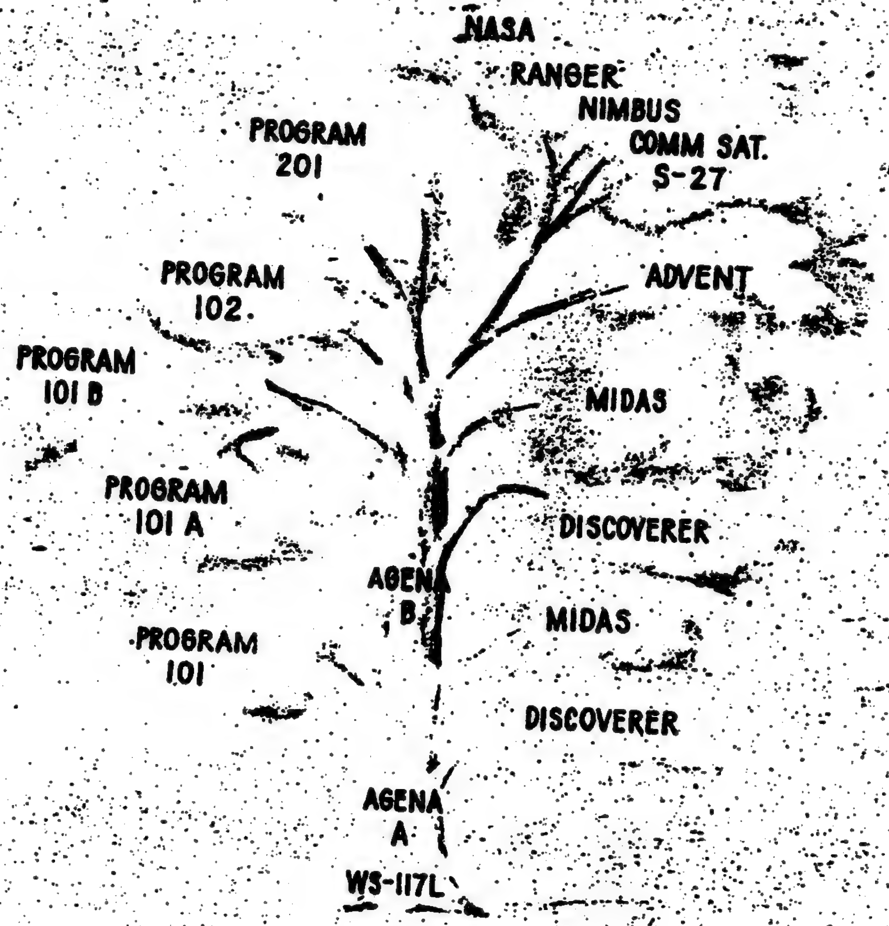
OUTLINE

- HISTORY OF AGENA GROWTH
- STANDARD AGENA STUDY
  1. OBJECTIVES
  2. APPROACH
- STUDY RESULTS
- PROCUREMENT & CONTRACTING
  1. SECOND SOURCE
  2. FIXED PRICE CONTRACT
- CONCLUSIONS
- RECOMMENDATIONS

30 June 1961
LITTLEFIELD

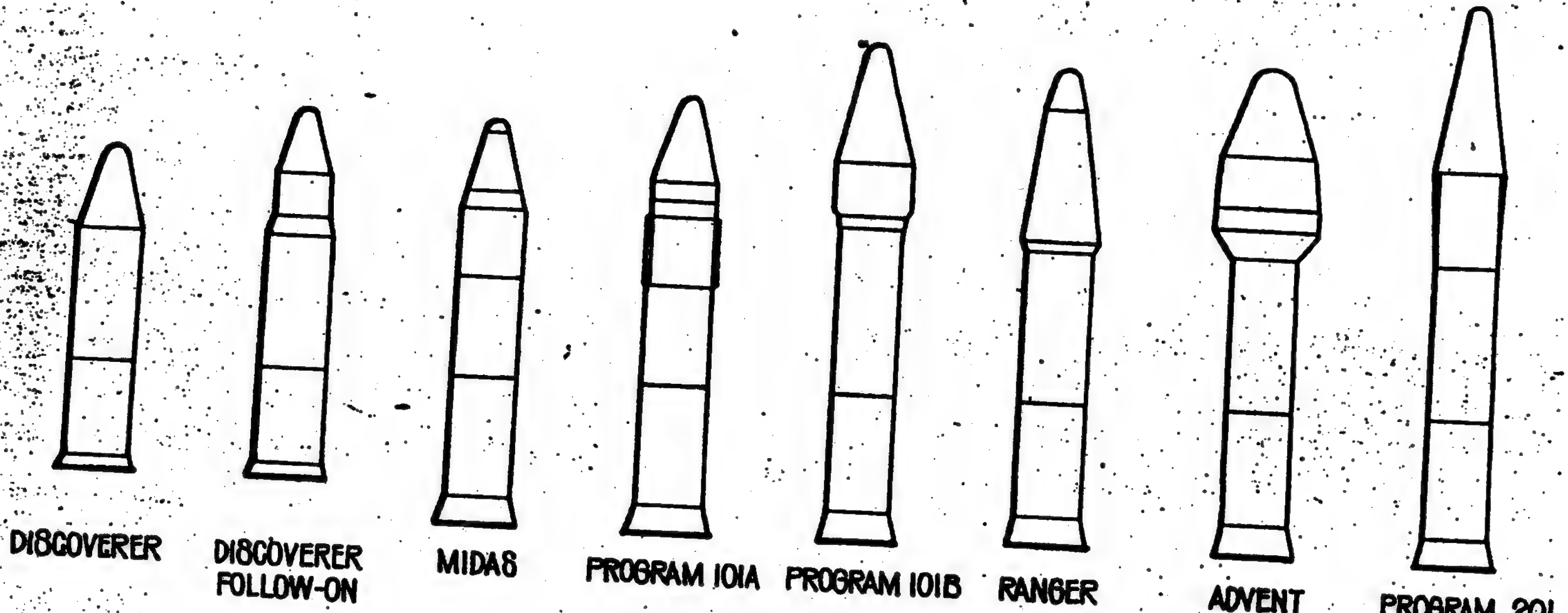
AGENA

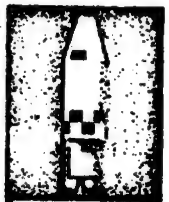
AGENA PROGRAM GROWTH



AGENA

CURRENT AGENA CONFIGURATIONS





AGENA

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MISSION REQUIREMENTS

PROGRAMS	TYPE ASCENT, ORBIT	LIFE REQ'D	ORBIT ATTITUDE	ORBIT ALTITUDE	BOOSTER	WEIGHT OF PAYLOAD
DISCOVERER	ORBIT/RECOVERY	1/4 DAYS	HORIZONTAL NOSE BACK	120/350	THOR	"L" FLIGHTS 1148
MIDAS	ORBIT	1 YEAR	VERTICAL NOSE DOWN	2000 CIRC.	ATLAS	1265
PROG. 101 A	ORBIT	8 DAYS	VERTICAL NOSE DOWN	260 CIRC.	ATLAS	1620
PROG. 101 B	ORBIT	5 DAYS	HORIZONTAL NOSE FWD	125/220	ATLAS	3145
PROG. 102	ORBIT	10 DAYS	VERTICAL NOSE DOWN	200/300 CIRC.	THOR	555 950 890
PROG. 201	ORBIT/RECOVERY	6/8 DAYS	HORIZONTAL NOSE FWD	150 CIRC.	ATLAS	4481
SNAPSHOT	ORBIT	90 DAYS	VERTICAL NOSE UP	700 CIRC.	ATLAS	SNAP 10A 2550 SNAP 2 1965
ADVENT	ASCENT				ATLAS	1265
SAINT	ASCENT				ATLAS	4400
VELA HOTEL	ASCENT				ATLAS	N/A
NASA (ALL)	ASCENT	MAX 50 MIN OPERATIONS	[redacted]	[redacted] TO LUNAR	THOR/ATLAS	RANGER 1080 NIMBUS 1290

882A-691

AGENA

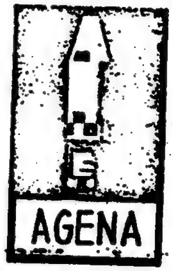
STUDY OBJECTIVES

- GAIN IN PERFORMANCE FOR ALL PRESENT PROGRAMS
- SINGLE BASIC VEHICLE MEETING ALL PROGRAM REQUIREMENTS
- MODULAR CONCEPT USING PRESENT FLIGHT-PROVEN EQUIPMENT
- SIMPLIFICATION IN:
  - VEHICLE DESIGN
  - FABRICATION
  - CHECKOUT
- PRODUCTION TECHNIQUES FOR LOWER COST, FIRM SCHEDULING
- ADAPTABILITY TO ADVANCED COMPONENTS WITHOUT CHANGE TO BASIC DESIGN

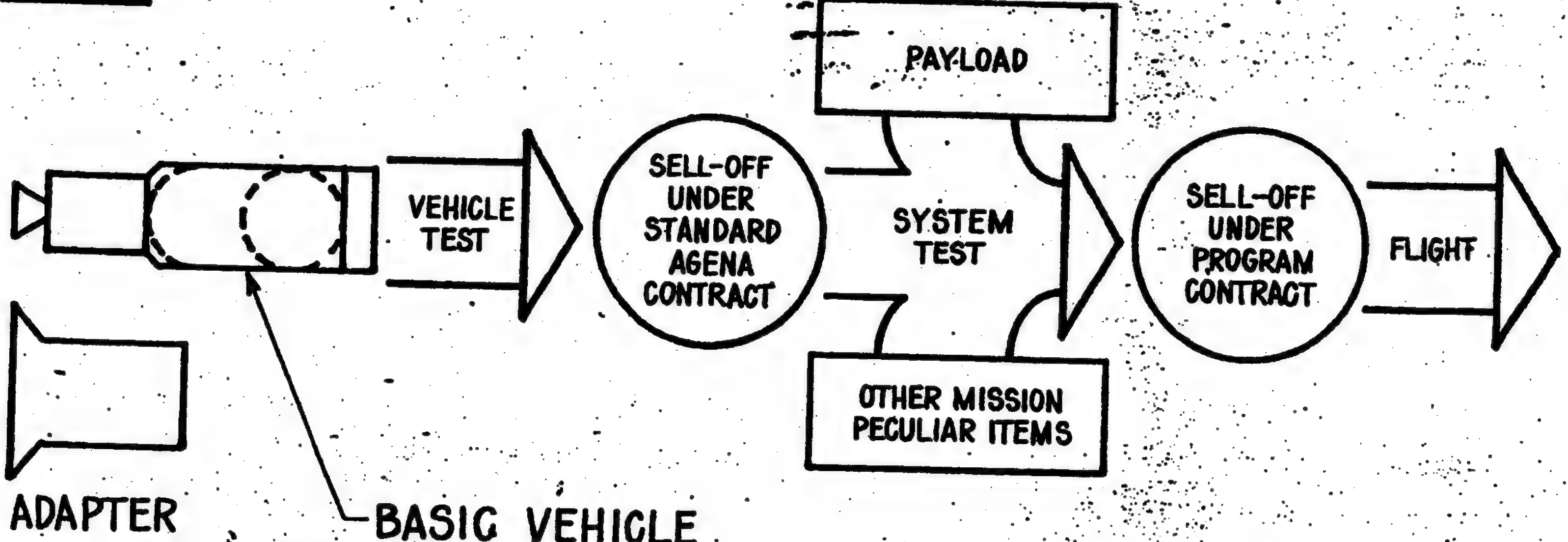
AGENA

ENGINEERING STUDY APPROACH

- CANVASS ALL PROGRAMS FOR ALL SYSTEM AND SUBSYSTEM FUNCTIONS
- ASSEMBLE ALL COMMON FUNCTIONS - CATEGORIZE ALL NON-COMMON FUNCTIONS
- COMPARE FUNCTIONS WITH EQUIPMENT CAPABILITIES
- SELECT EQUIPMENT HAVING COMMON FUNCTION CAPABILITY - DETERMINE MODS NECESSARY TO OTHERS
- ASSEMBLE AND CATEGORIZE ALL PROGRAM REQUIREMENTS - LIFE, ATTITUDE, ALTITUDE, POWER, ETC
- DESIGN COMPATIBLE AIRFRAME, INSTALL COMMON COMPONENTS, PROVIDE SPACE FOR OPTIONAL MISSON - REQUIRED MISSIONS



STANDARD AGENA CONCEPT


VEHICLE TEST
SELL-OFF UNDER STANDARD AGENA CONTRACT
PAY-LOAD
SYSTEM TEST
OTHER MISSION PECULIAR ITEMS
SELL-OFF UNDER PROGRAM CONTRACT
FLIGHT
ADAPTER

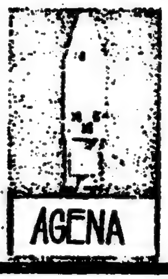
BASIC VEHICLE

CONSISTS OF:

- FRONT RACK, TANK & AFT RACK
- 8096 ENGINE RESTARTABLE
- BATTERIES & POWER FOR ASCENT
- GUIDANCE & CONTROL FOR ASCENT
- TELEMETRY FOR ASCENT
- BRACKETRY, CABLING JUNCTION BOXES

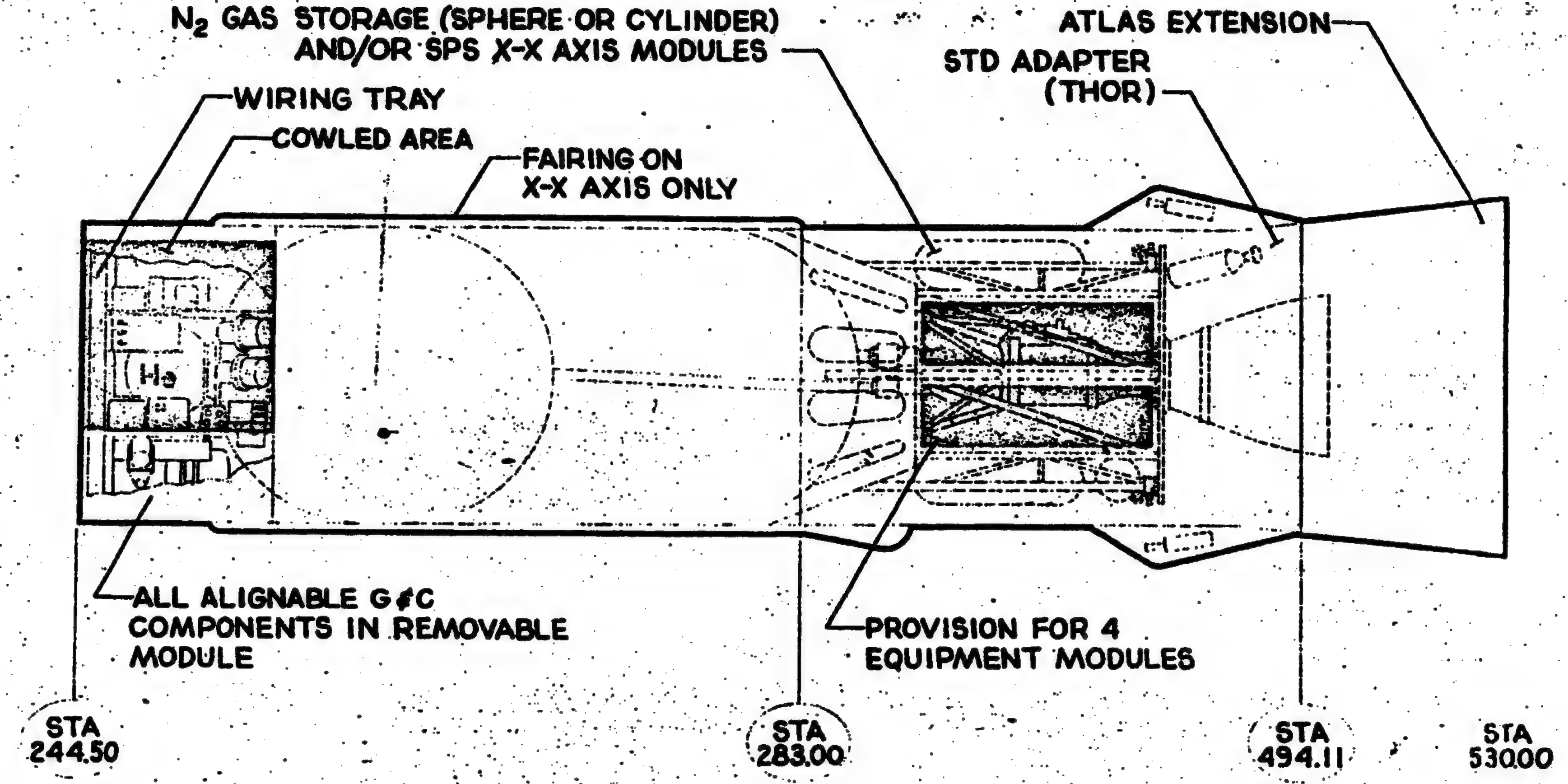
EXAMPLES

- NOSE FAIRING
- SECONDARY PROPULSION SYS.
- EXTRA BATTERIES & GAS BOTTLES
- CONTROL MOMENT GYROS
- BEACONS, PROGRAMMERS
- BRACKETRY, CABLING JUNCTION BOXES



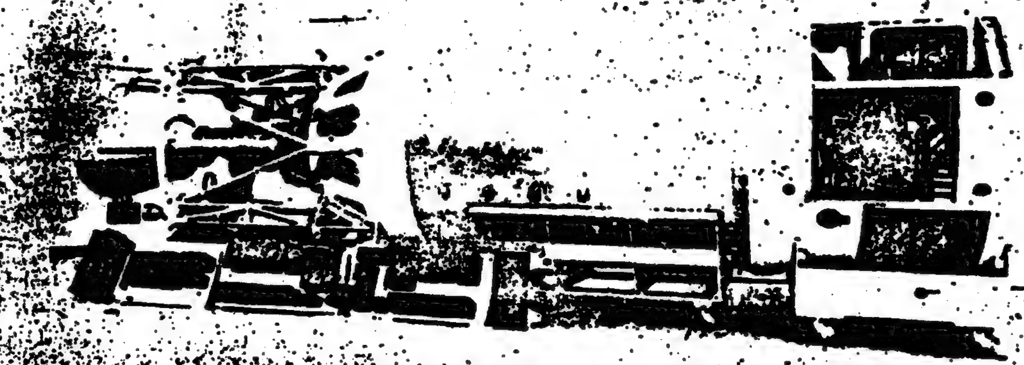
STANDARD AGENA CONFIGURATION

INBOARD PROFILE


N_2 GAS STORAGE (SPHERE OR CYLINDER) AND/OR SPS X-X AXIS MODULES
ATLAS EXTENSION
STD ADAPTER (THOR)
WIRING TRAY
COWLED AREA
FAIRING ON X-X AXIS ONLY
He
ALL ALIGNABLE G&C COMPONENTS IN REMOVABLE MODULE
PROVISION FOR 4 EQUIPMENT MODULES
STA 244.50
STA 283.00
STA 494.11
STA 530.00

AGENA

STANDARD AGENA MOCKUP



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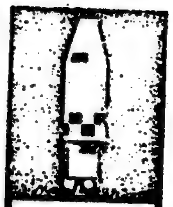

AGENA

WEIGHT COMPARISON

STD AGENA VS PRESENT DESIGNS

	DISC.	MIDAS	ADVENT	PROG 101 A	PPOG 101 B	PROG 102	PROG 210	NASA/ LUNAR	NASA/ ORBIT
STRUCTURE	+44	-168	-40	-159	-151	-34	+10	+2	-17
PROP	+3	+6	+8	+3	-15	+3	-13	+8	+8
AUX PWR	-15	-54	0	-51	-50	+9	-2	-17	-13
GUID & CONT	+31	-11	+13	-23	-20	-5	-2	+8	+8
C & C	-5	-6	+7	-5	+11	-1	0	-1	+5
NET CHANGE	+58	-233	-12	-235	-225	-28	-7	0	-9

[redacted]

SSZA 691

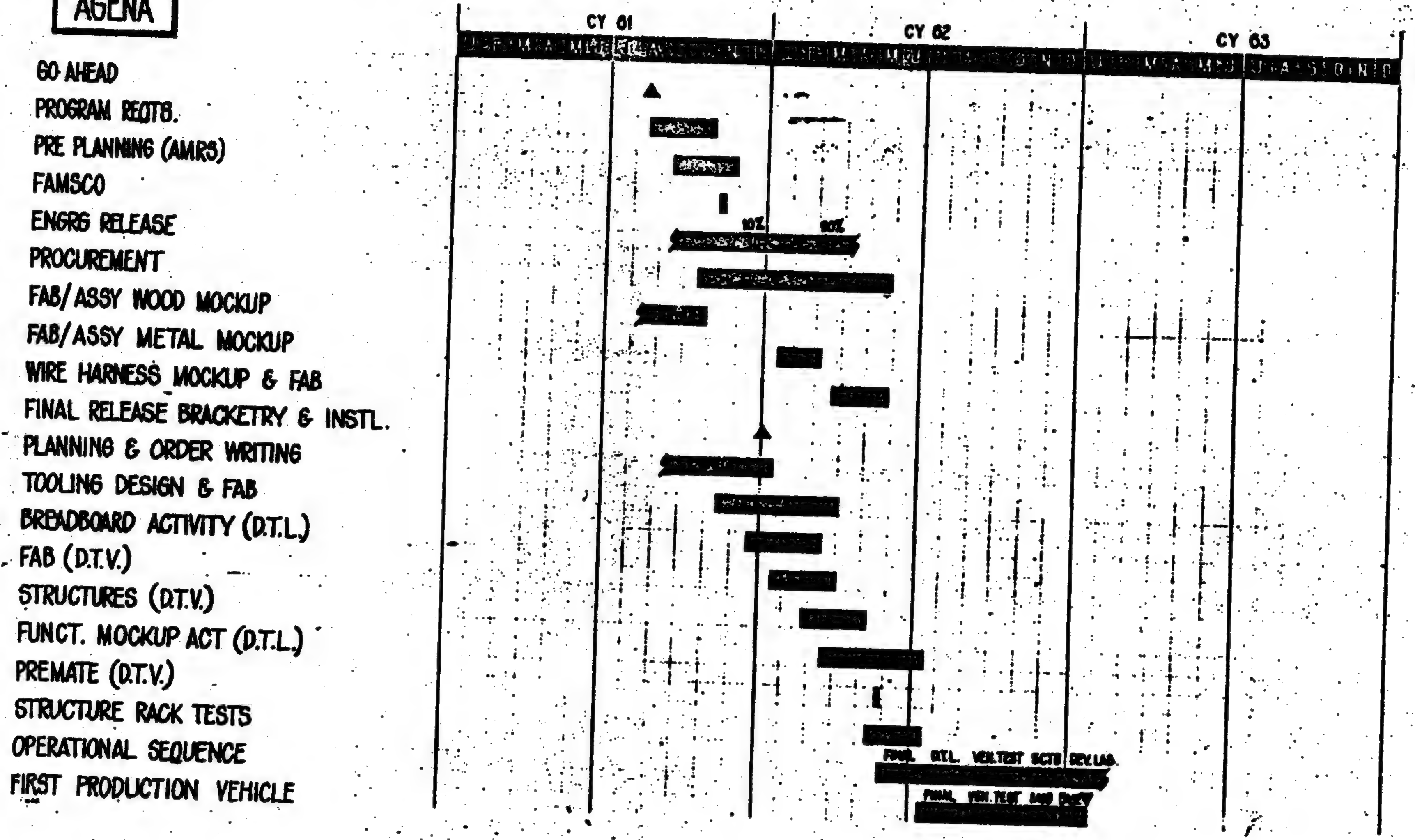
ADVANTAGES OF STANDARDIZED CONCEPT

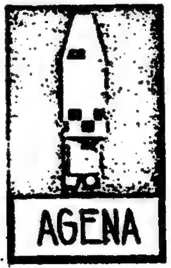
IN ADDITION TO PERFORMANCE GAIN, PROVIDES:

- RELIABILITY
- ECONOMY
- MAINTAINABILITY
- ACCESSIBILITY
- PRODUCIBILITY
- BLUE SUIT OPERATION

AGENA

TENTATIVE MASTER PHASING PLAN





ESTIMATED COST OF STANDARD AGENA

	MILLIONS
● DEVELOPMENT OF BASIC VEHICLE	$ 7.86
DESIGN AND RESEARCH SUPPORT	
ENGINEERING AND MOCKUP	
TESTING	
PROCUREMENT DATA	
● MANUFACTURING - 4 FLIGHTS + 1 DTV	9.61
FABRICATION AND TOOLING SPARES	
VEHICLE TESTING	
TEST EQUIPMENT	
QUALITY ASSURANCE	
RELIABILITY	
● LAUNCH COSTS - 4 FLIGHTS	2.73
TOTAL	$ 20.20

ESTIMATED PRODUCTION COSTS
STANDARD AGENA

● THIRD VEHICLE	1.3
● TENTH	1.1
● TWENTY - FIFTH	1.0

- INCLUDES - SPARES
- EXCLUDES - MISSION EQUIPMENT
  MISSION PAYLOAD
  LAUNCH COSTS

CONTRACTUAL
CHARTS

AGENA

PROCUREMENT OF STANDARD AGENA

- ASSUMPTIONS—
  - SECOND SOURCE
  - FIXED PRICE CONTRACT
  - LMSC PRODUCTION
  - UNIFORM CONFIGURATION
  - DELIVERY JAN 1963

AGENA

SECOND SOURCE CRITERIA

- LICENSE
- LMSC CONFIGURATION—
- SAME MAKE OR BUY STRUCTURE
- SAME SUBCONTRACTORS

CONTRACTOR	ITEM	COST
BELL	ENGINE	$200,000
	VELOCITY METER	40,000
AEROJET-GENERAL	ROCKETS	20,000
M-H	IRP	42,000
GE/BARNES	HORIZON SENSOR	35,000
ENGINEERING MAGNETICS	INVERTERS POWER SUPPLY	11,000
BENDIX/WESTON/STEERE	GAS VALVES	7,000
	MISCELLANEOUS ITEMS	45,000
		$400,000

COMPETITION - SECOND SOURCE

- ADVANTAGES —

  PRICE

  BACK-UP

  UTILIZATION OF INDUSTRIAL BASE

  INDUSTRIAL RELATIONS

  STIMULATE EFFICIENCY

COMPETITION - SECOND SOURCE

- DISADVANTAGES —

  DUPLICATE COSTS

  LONGER LEAD TIME

  NEED FIRM CONFIGURATION

  MANAGEMENT PROBLEMS

  IMPACT OF CUT BACK

  RELIABILITY DECREASED

AGENA

COMPETITION – SECOND SOURCE

- REQUIREMENTS
  - INDUSTRY CAPABILITY
  - FIRM CONFIGURATION
  - COMPANY DESIRE
  - LEAD TIME
  - FUNDS

AGENA

FIXED PRICE CONTRACT

- ADVANTAGES

  LESS AF CONTRACT MANAGEMENT

  INCREASED INCENTIVE

  LESS OVERRUN POSSIBILITY

  AF BUDGETING FACILITATED

AGENA

FIXED PRICE CONTRACT

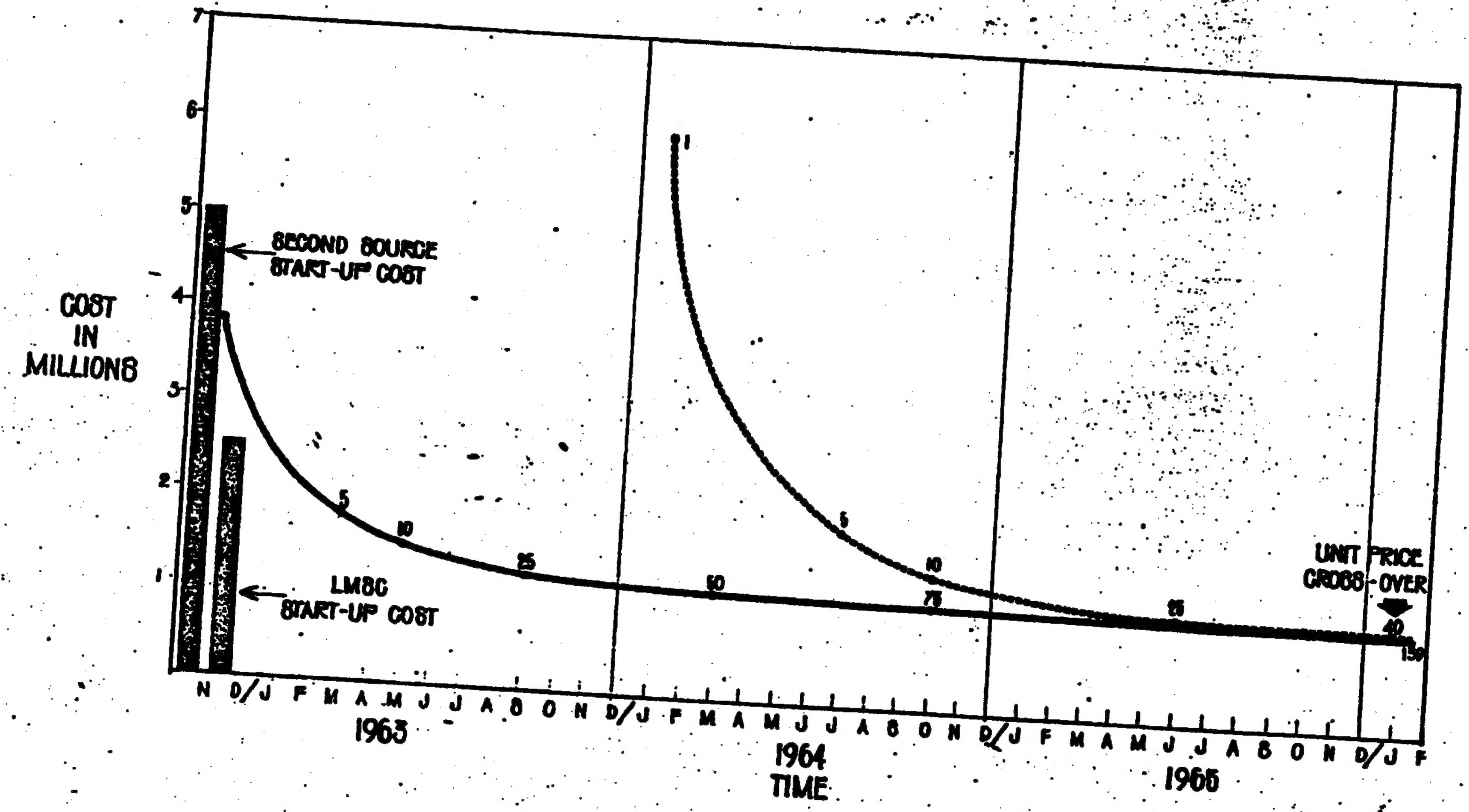
- DISADVANTAGES
  - NEED COMPLETE PROCUREMENT DATA
  - MORE CONTRACT CHANGES
  - FP MIXED WITH CPFF CONTRACTS
- REQUIREMENTS
  - PROCUREMENT DATA
  - PRICE KNOWLEDGE

CONCLUSIONS

- COMPETITION — SECOND-SOURCE
  - NO FIRM CONFIGURATION
  - SECOND SOURCE PROBLEMS
  - QUESTIONABLE COST SAVING
  - NO BACK UP REQUIREMENT
  - CANNOT DELIVER BY JAN 63
- FIXED PRICE CONTRACT
  - DESIRABLE
  - NO PROCUREMENT DATA
- DISADVANTAGES vs. ADVANTAGES

STANDARD AGENA

DELIVERY - UNIT COST CURVES
LMSC (CPFF) VS. SECOND SOURCE (FP)



AGENA

RECOMMENDATIONS

[redacted]

- APPROVE STANDARD AGENA CONCEPT
- GRANT IMMEDIATE AUTHORITY TO AWARD CONTRACT
- NO FURTHER SECOND SOURCE CONSIDERATION
- COST TYPE CONTRACT WITH LMSC
- CONSIDER FIXED PRICE TYPE CONTRACT LATER

[redacted]